

isel - CAN - I/O - Module

User Manual for

- **CAN In-/Output-module 16/16**
- **CAN In-/Output-module 8/12-4/1**

About this manual:

The information, technical data and dimensions contained in this print are up-to-date when published. Any possible misprints and mistakes cannot be excluded however. We are thankful for any suggestion for improvement and indication of mistakes.

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1 Introduction

The CAN-I/O-Module is an Input/output-module for peripheral automation by linking intelligent modules to the CAN-Bus (Controller Area Network).

Such modules are:

Positioning modules for numerical axes, e.g. IMD10 – IMD40 from *ise/*automation, HF-Inverter for working spindles, I/O-Modules for binary (analog) Input/output, e.g. CAN-I/O-Modules from *ise/*automation.

All CAN-Modules are intelligent, that means they have at least one microprocessor with integrated and on chip CAN-Controller. The CAN-I/O-Modules follow the CANopen- Standard Device profile for I/O-Modules: CiA Draft Standard Proposal DS301 V4.0 und DS401 V2.0.

The **advantages** of using I/O-Modules with CAN interface are:

- The binary (analog) Inputs and Outputs are available close to the process sensors (inputs) as well as to the actuators (outputs). A costly, susceptible and EMC sensitive cabling to the (central) CNC-Controller (CNC-Master, CNC-Control) will be cancelled.
- Additional modules can be integrated and configured in a simply way:
 1. Plug node to CAN-Bus
 2. Set a new node address for the I/O module
 3. Assign the respective software driver (DLL) to the application software (ProNC or Remote)
- There are extensive diagnostic- and test-possibilities because every CAN-I/O-Module is intelligent. That means, that the modules are able to give status information and error-information to the CNC-Master on demand.

2 Safety guidelines

- The CAN-I/O-Modules 16/16 resp. 8/12-4/1 are designed to current technical and recognized rules.
- The device may only be used if it is in correct condition. Any faults have to be eliminated immediately. Neither children nor non-authorized persons are allowed to put the device into operation.
- The device may only be used for the intended use, i.e. I/O operations.
- All work on the module must be executed from authorized personal regarding electrical industry rules and accident prevention regulations.
- Assembly and use of operating material has to be according to the standards of conformity declaration. In case of in proper use even the observation the respective rules and standards does not protect against physical damages and damage to property.
- Do not expose the device to high humidity or high vibrations.
- Please take care of the instruction manual. Be sure that all users know the instructions.
- Ignoring the instruction manual can lead to damage, heavy physical damage or to death.

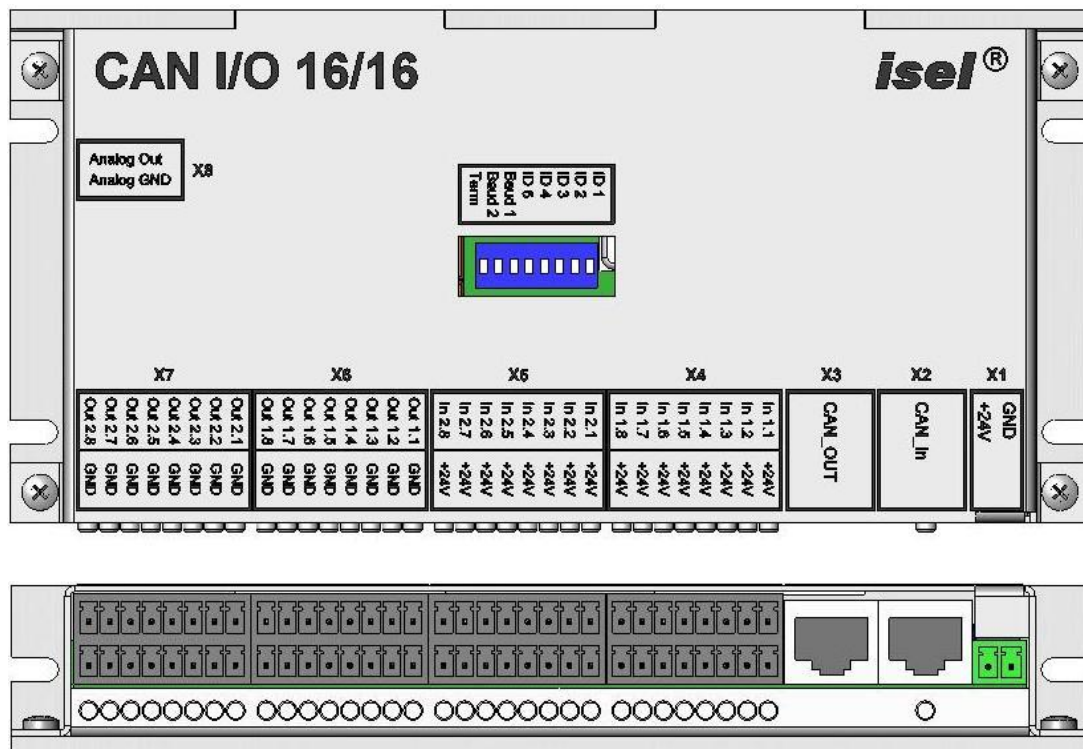
3 Technical specifications

3.1 General

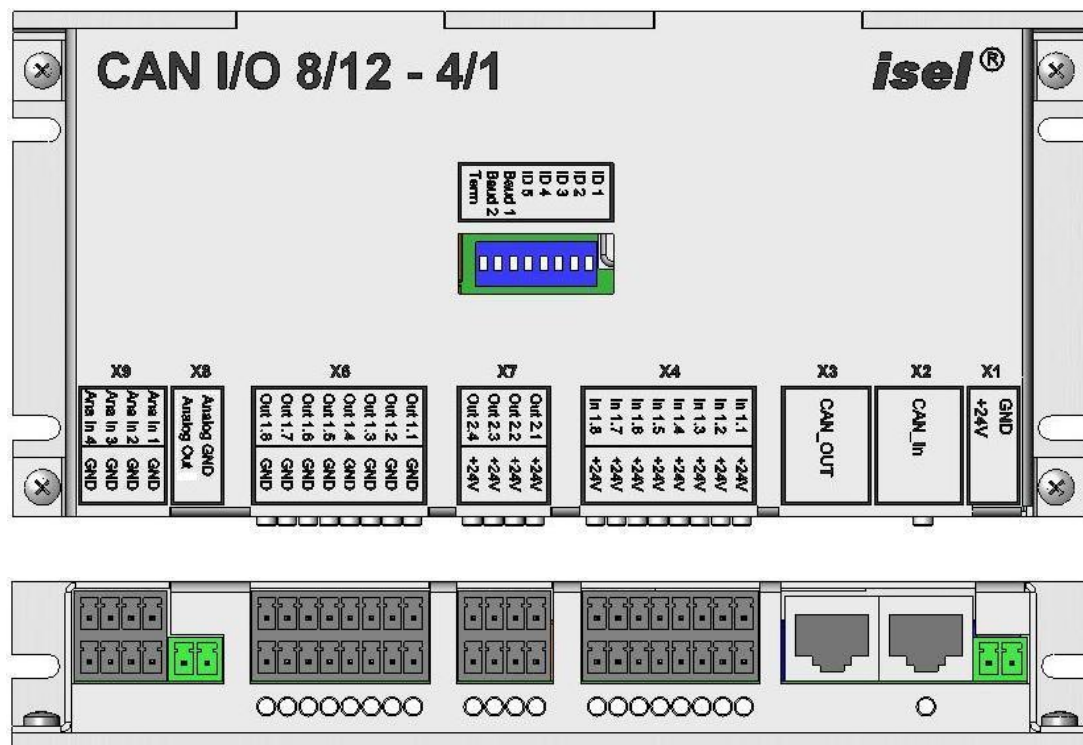
box size:	85mm (B) x 180mm (H) x 28mm (T)	
weight:	260 g	
safety class:	IP20	
power supply:	24VDC (logic voltage), 24VDC (process voltage)	
power consumption:	160mA (logic and relay) I_{Load} depends on external electrical circuit	
ambient temperature:	5°C bis +40°C	
storage temperature:	-25°C bis +70°C	
relative humidity:	max. 95%	
CAN - IO - 16/16		
digital inputs:	16	optocoupler (input current about. 8mA)
digital outputs:	16	8 x relays, $I_{max} < 5A$ 8 x electronic, $I_{max} < 350mA$ (thermic short-circuit protection)
analog output:	1	0V – 10V over 8Bit D/A converter (if the analog output is used the eight electronic digital outputs can not be used for binary output)
CAN - IO - 8/12 - 4/1		
digital inputs:	8	optocoupler (input current ca. 8mA)
digital outputs:	12	4 x relays, $I_{max} < 5A$ 8 x electronic, $I_{max} < 350mA$ (thermic short-circuit protection)
analog output:	1	0V – 10V over 8Bit D/A transformer
analog inputs:	4	0V – 10V, 16Bit resolution
fuse:	250mA/250V quick	

3.2 Module overview

CAN-IO-16/16



CAN-IO-8/12- 4/1



3.3 Plug allocation

Supply voltage

Phoenix Mini Combicon 2 pins

<i>modul</i>	<i>connector</i>	<i>pin</i>	<i>signal</i>	<i>description</i>
CAN-IO 16/16	X1	1	GND	supply voltage GND
		2	+24V	supply voltage +24V
CAN-IO 8/12-4/1	X1	1	GND	supply voltage GND
		2	+24V	supply voltage +24V

CAN In, CAN Out

RJ45 connector

<i>modul</i>	<i>connector</i>	<i>pin</i>	<i>signal</i>	<i>description</i>
CAN- IO 16/16	X2 CAN In X3 CAN Out	1	n.c.	not connected
		2	n.c.	not connected
		3	n.c.	not connected
		4	CAN_H	signal CAN high
		5	CAN_L	signal CAN low
		6	CAN_GND	GND
		7	n.c.	not connected
		8	n.c.	not connected
CAN-IO 8/12-4/1	X2 CAN In X3 CAN Out	1	n.c.	not connected
		2	n.c.	not connected
		3	n.c.	not connected
		4	CAN_H	signal CAN high
		5	CAN_L	Signal CAN low
		6	CAN_GND	GND
		7	n.c.	not connected
		8	n.c.	not connected

Input ports

Phoenix Mini Combicon 8 x 2 pins

<i>module</i>	<i>connector</i>	<i>pin bottom</i>	<i>signal</i>	<i>description</i>
CAN- IO 16/16	X4 In 1 and X5 In 2	1	+24V	
		2	+24V	
		3	+24V	
		4	+24V	
		5	+24V	
		6	+24V	
		7	+24V	
		8	+24V	
		<i>pin top</i>	signal	description
		9	In 1	bit 0
		10	In 2	bit 1
		11	In 3	bit 2
		12	In 4	bit 3
		13	In 5	bit 4
		14	In 6	bit 5
		15	In 7	bit 6
16	In 8	bit 7		
		<i>pin bottom</i>	<i>signal</i>	description
CAN-IO 8/12-4/1	X4 In 1	1	+24V	
		2	+24V	
		3	+24V	
		4	+24V	
		5	+24V	
		6	+24V	
		7	+24V	
		8	+24V	
		<i>pin top</i>	signal	description
		9	In 1	bit 0
		10	In 2	bit 1
		11	In 3	bit 2
		12	In 4	bit 3
		13	In 5	bit 4
		14	In 6	bit 5
		15	In 7	bit 6
16	In 8	bit 7		

Output ports

Phoenix Mini Combicon 8 x 2pol.

<i>module</i>	<i>connector</i>	<i>pin bottom</i>	<i>signal</i>	<i>description</i>
CAN- IO 16/16	X6 Out 1	1	GND	
		2	GND	
		3	GND	
		4	GND	
		5	GND	
		6	GND	
		7	GND	
		8	GND	
	X7 Out 2	<i>pin top</i>	signal	description
		9	Out 1	bit 0
		10	Out 2	bit 1
		11	Out 3	bit 2
		12	Out 4	bit 3
		13	Out 5	bit 4
		14	Out 6	bit 5
		15	Out 7	bit 6
		16	Out 8	bit 7
		<i>pin bottom</i>		
CAN-IO 8/12-4/1	X6 Out 1	1	GND	
		2	GND	
		3	GND	
		4	GND	
		5	GND	
		6	GND	
		7	GND	
		8	GND	
	X7 Out 2	<i>pin top</i>		
		9	Out 1	bit 0
		10	Out 2	bit 1
		11	Out 3	bit 2
		12	Out 4	bit 3
		13	Out 5	bit 4 (not on X7)
		14	Out 6	bit 5 (not on X7)
		15	Out 7	bit 6 (not on X7)
		16	Out 8	bit 7 (not on X7)

Analog output

Phoenix Mini Combicon 2 pins

<i>module</i>	<i>connector</i>	<i>pin</i>	<i>signal</i>	<i>description</i>
CAN-IO 16/16	X8 AnaOut	1	analog Out GND	reference for analog output
		2	analog Out	analog output (0 – 10V)
CAN-IO 8/12-4/1	X8 AnaOut	1	analog Out GND	reference for analog output
		2	analog Out	analog output (0 – 10V)

Analog inputs

Phoenix Mini Combicon 2 pins

<i>module</i>	<i>connector</i>	<i>pin bottom</i>	<i>signal</i>	<i>description</i>
CAN- IO 16/16		-	-	-
		<i>pin bottom</i>	<i>signal</i>	<i>description</i>
CAN-IO 8/12-4/1	X9 Analn	1	GND	reference for analog input 1
		2	GND	reference for analog input 2
		3	GND	reference for analog input 3
		4	GND	reference for analog input 4
		<i>pin top</i>		
		5	Analog In 1	analog input 1
		6	Analog In 2	analog input 2
		7	Analog In 3	analog input 3
		8	Analog In 4	analog input 4

3.4 DIP Switches

The node address of a CAN module is used to clearly identify the device on the CAN bus.

We submit the following assignment of the modules node address:

<i>Module</i>	<i>Node address</i>
1. positioning module	→ Node address 1
2. positioning module	→ Node address 2
3. positioning module	→ Node address 3
additional positioning module	→ Node address 4-9
4. I/O-module (first)	→ Node address 16
5. I/O-module (second)	→ Node address 17
additional I/O-modules	→ Node address 18 and 19
6. HF- converter	→ Node address 10
additional HF-converter	→ Node address 11,12 or 13

CAN Node address (S1 – S5)

The switches S1 – S5 are used to set the CAN node address. Possible values are 1 to 31.

<i>Node address</i>	<i>S1</i>	<i>S2</i>	<i>S3</i>	<i>S4</i>	<i>S5</i>
16	off	off	off	off	on
17	on	off	off	off	on
...					
31	on	on	on	on	on

Baud rate (S6 – S7)

The switches S6 and S7 are used to set the baud rate.

Following values are possible:

Baud rate	S6	S7
1 MBit/s	off	off
500 KBit/s	on	off
125 KBit/s	off	on
20 KBit/s	on	on

Terminating resistor (S8)

Switch S8 is used to switch a termination resistor on or off. If the switch is on a 120 Ohm resistor is enabled.

3.5 Usage

! Be sure that the jumper settings are correct before you build in the CAN-I/O module.

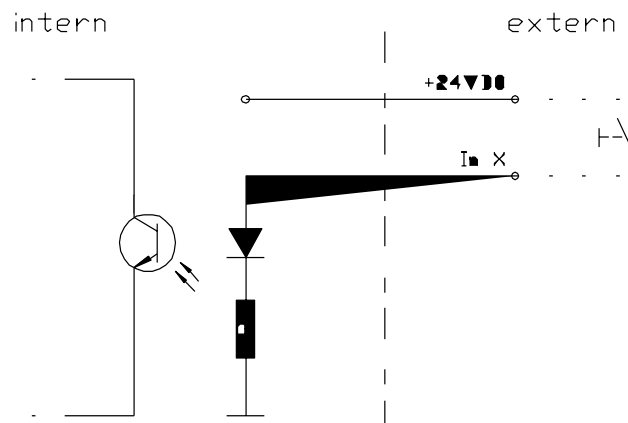
3.5.1 Base connection

If you have configured the DIP switches the module can be built in to the intended mounting place. Now the 24V-power supply (logic voltage) must be connected with X1 (see connection assignment). Also the CAN- bus interface connection must be plugged in (CAN In must be connected)

! If the CAN-I/O-module is the last device in the CAN-topology the DIP-switch 8 must be set to “on” to enable the terminating resistor.

3.5.2 Digital inputs

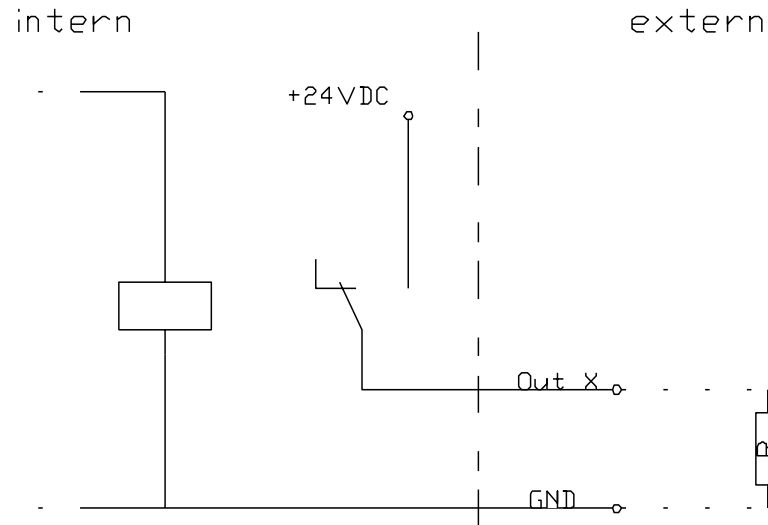
The digital inputs of the CAN-I/O-modules are realized using 24V-DC process voltage can be integrate to the respective application as follows:



The input load is about 8mA.

3.5.3 Digital outputs

The digital outputs of the CAN-I/O-modules switch 24V-DC process voltage. Integrate the outputs as follows:



The relay outputs of Port1 (X6) can be rated with 5A, the outputs of Port2 (X7) up to 350mA. If the integrated D/A converter is used Port2 is reserved. That means Port2 is not longer available for digital outputs. To prevent confusions you can deactivate Port2 by removing Jumper1. Through this the Port2 LEDs are also deactivated.

3.5.4 Analog output

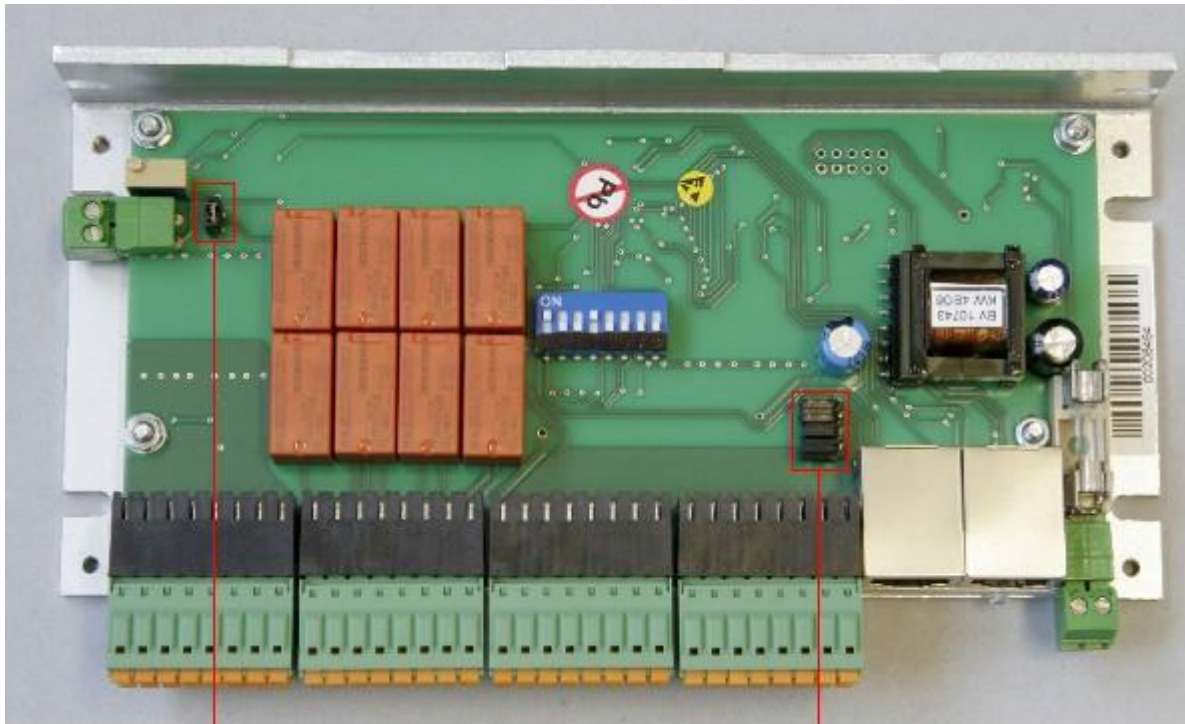
You can use this output for controlling an external device (e.g. HF converter).

If the analog output is used, Port2 is no longer available for digital outputs.



Output current not more than 15mA!

CAN-I/O 16/16 Jumper settings



Jumper plugged:

- if the analog output is in use the LED from output Port A2 signalizes the binary analog output value.

Delivery state:

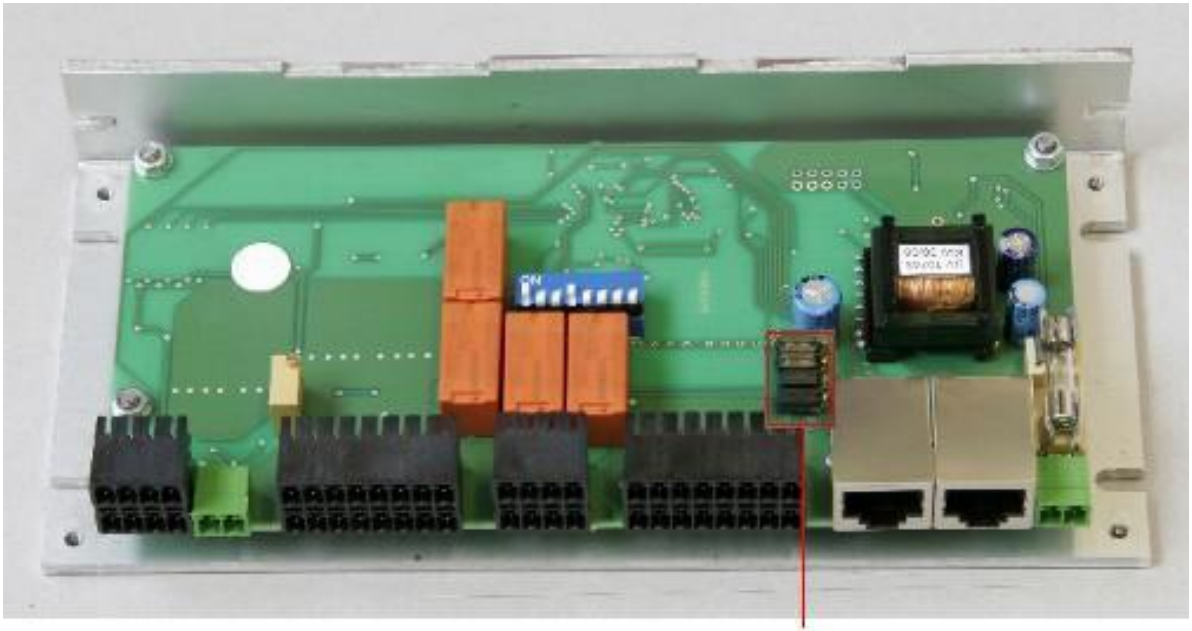
- Jumper not plugged, galvanic separation of 24V process voltage and 24V logic voltage.



If you plug the jumpers there is no galvanical separation!

This may be effects damages on the CAN-I/O-Module.

CAN-I/O 8/12 - 4/1 Jumper settings



Delivery state:

- Jumper not plugged, galvanic separation of 24V process voltage and 24V logic voltage.

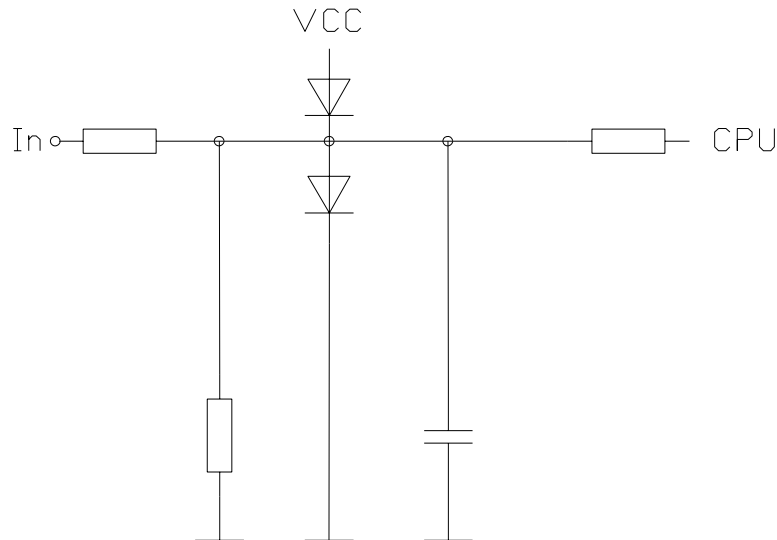


If you plug the jumpers there is no galvanical separation!

This may be effects damages on the CAN-I/O-Module

3.5.5 Analog input

The module CAN-I/O-8/12-4/1 has 4 analog Inputs with an input voltage range from 0V to 10V with a resolution of 10Bit. On these inputs you can directly connect e.g. sensors. The inputs have an input impedance of 2kOhms and provides an internal RC filter.



3.5.6 Diagnosis

Diagnosis of the modules is possible by using the status LED. This LED signals 3 different states:

<i>LED duty cycle</i>	<i>state</i>
10%	No error → normal operation
50%	Uncritical error or warning
90%	Critical error (NMT error, output error)

4 Integration into the control software (ProNC, Remote)

4.1 Settings in the module management

At first the Interface-DLL which opens the connection between ProNC/Remote and CAN-IO-Device must be set-up.

If not already available, copy the files

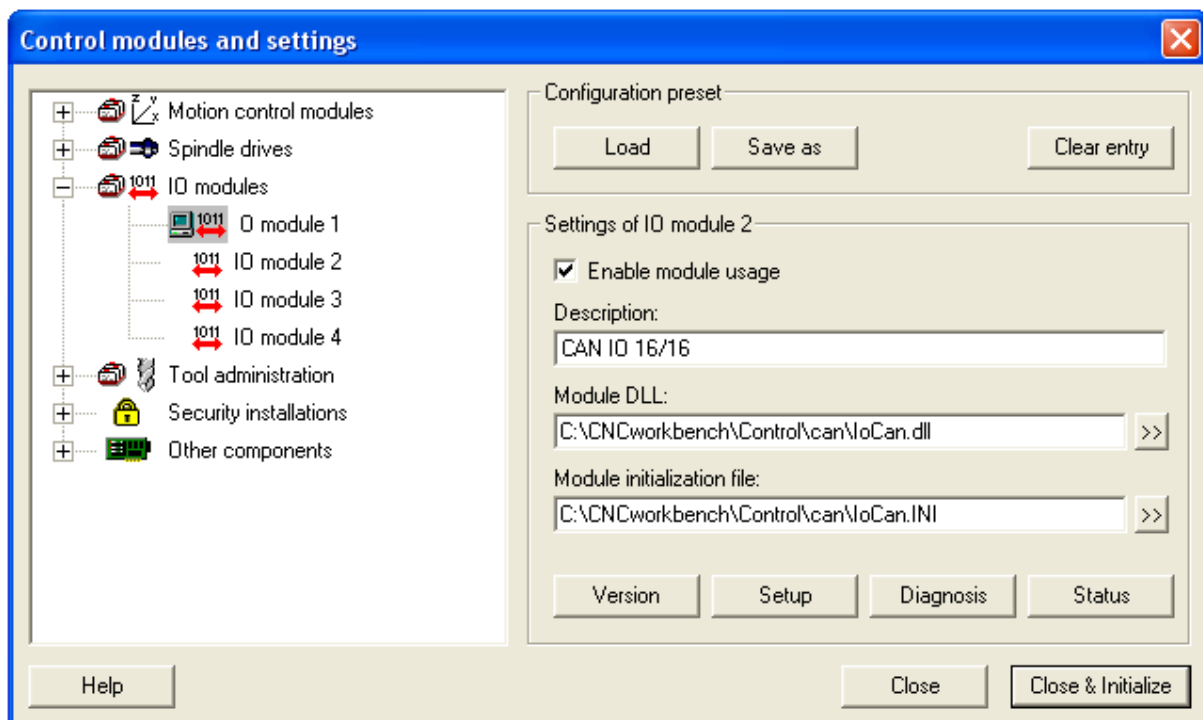
IoCan.DLL
and
IoCan.INI

into a new sub-directory of the CNCworkbench - directory.

Our suggestion for the new directory:

{ProgramPath}\CNCWorkbench\Control\Can

After the files are copied the application must get to know the new IO-device-
Therefore start ProNC/Remote and open the Setup-dialog for the control with the
help of the command "Setup – Control...". The following dialog will be appear:



Follow the commands to get the USB-IO device into the modul management:

- Choose in the tree view the IO-Modul which is not in use and name it e.g CAN-IO-16/16" or "CAN IO".
- Click on ">>" next to the Edit field "Modul DLL". Choose the "IoCan.DLL" in the "\CNCWorkbench\Control\Can" directory. The Edit field "Modul initialisation file" shows automatically the "CNCWorkbench\Control\Can\IoCan.INI" file. You don't need to rename the file.
- Click on "Setup" (in case nothing will happen, choose another IO-Modul from the tree view and after that choose the IO-Modul for the CAN-IO). Click on "Setup" to open the Setup dialog.

Initialization values for the CAN-I/O module

Node address (Node-ID) of the module:	16	decimal
Set default value for output port A1 to:	0	decimal
Set default value for output port A2 to:	0	decimal
Set default value for output port A3 to:	0	decimal
Set default value for output port A4 to:	0	decimal
Set default value for output port A5 to:	0	decimal
Set default value for output port A6 to:	0	decimal
Set default value for analogous output to:	0	mV
Set default value for Pw/M signal (0 ... 1000) to:	0	Promille

ise/ CAN-I/O Module 16/16

☒ Use binary Output port A2 as Analog Channel

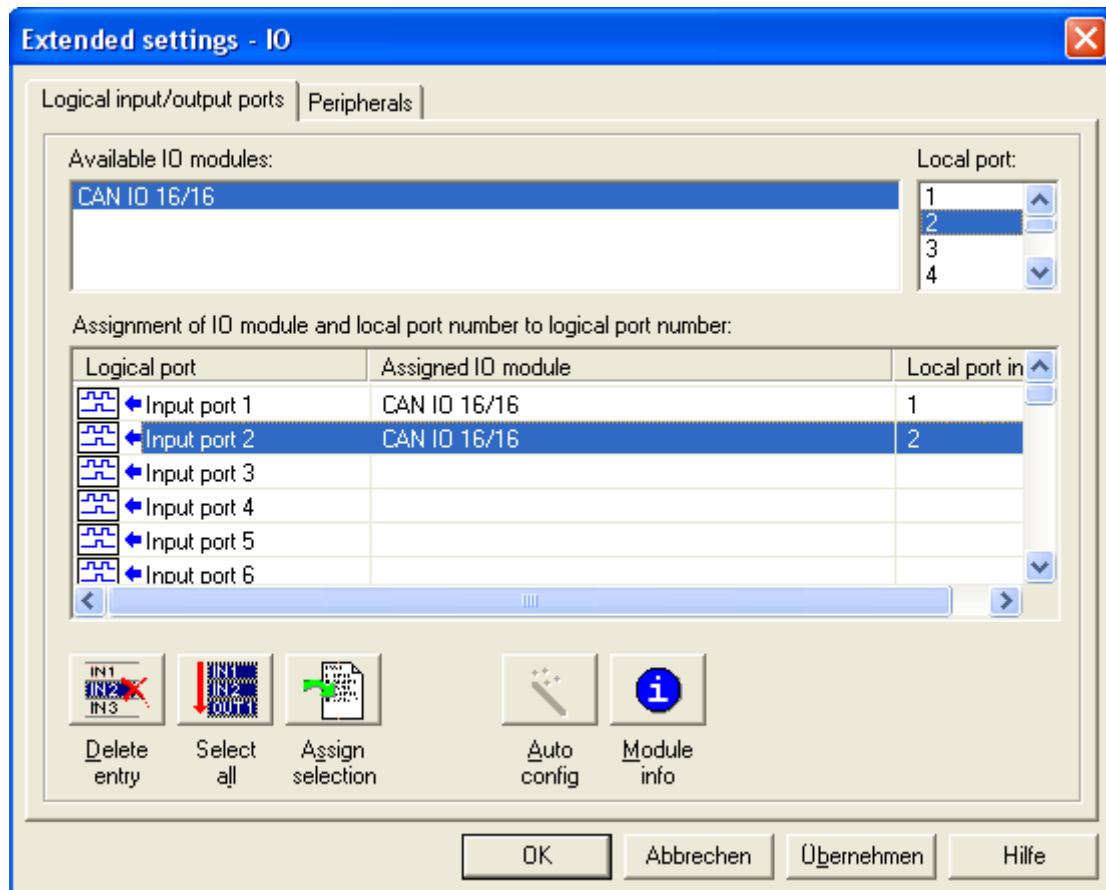
Hint: When activating this option the Output port A2 is not available for binary output (please observe the jumper setting as shown in the CAN-I/O Manual !)

Abort OK

In this dialog you can set different settings for the module. The most important setting are the node address of the module. The default value for the address is 16. Furthermore you can set initialization values for digital and analog output ports. If you start the software (ProNC/Remote) these values will be set.

4.2 Settings within the Control-Administration

To get access to the IO-module within the Control-Administration one setting in the top level must be changed. Open the "Extended settings-IO" - Dialog as follows. Highlight in the tree structure "IO modules". Click on "Extended settings" on the right side. You can see the following dialog:



The IO-module "IoCan.DLL" needs a logical Input/Output port number to access the In-/Output-functions. Mind the following notes:

- Highlight a free logical port, for example: input 1
- Choose in "Available IO modules" the "CAN IO 16/16".
- Choose in the list "Logical port" the 1.
- Click on "Assign selection"
- Click on "OK" to close the dialog

After that the "Assigned IO modul" and the "Logical port in module" in the highlighted row should be as shown in the picture. Now you must do the described steps for all logical output ports, analog output and analog input. You find these entries by scrolling down in the list field.

Close the dialog "Control modules and settings" over the button "Close & Initialize" to reinitialize the new modules.

The following lines shows the use of local input ports, output ports, analog output and analog input of the different modules.

CAN- IO- 16/16

Local input ports: Port 1 und Port 2

Local output ports: Port 1 und Port 2

Local analog output: Port 1

! *If the analog output ist used, Port2 (X7) is no longer available for digital outputs. You must clear the entry for this port in the list.*

CAN- IO- 8/12- 4/1

Local input ports: Port 1

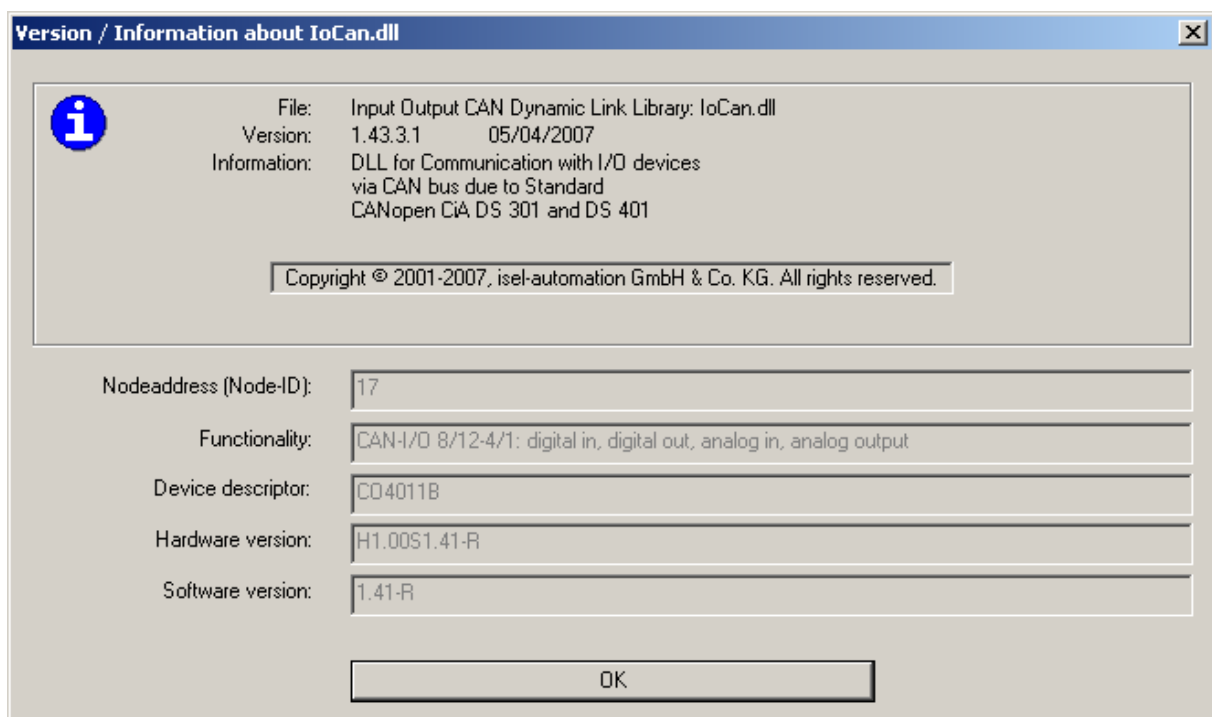
Local output ports: Port 1 und Port 2

Local analog output: Port 1

Local analog inputs: Port 1 - 4

! *At the local output port 2 you can only use the outputs 1-4 (A2.1, A2.2, A2.3 and A2.4).*

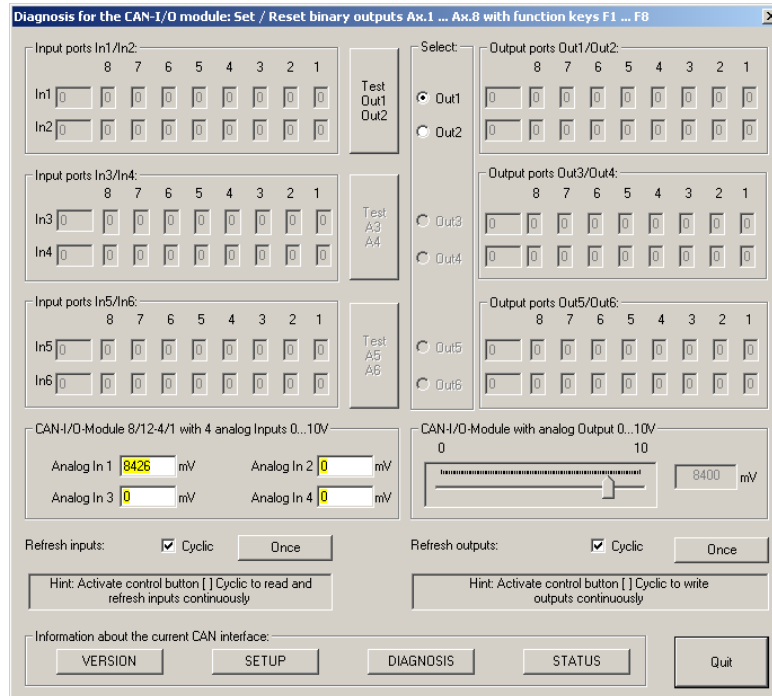
4.3 Version information



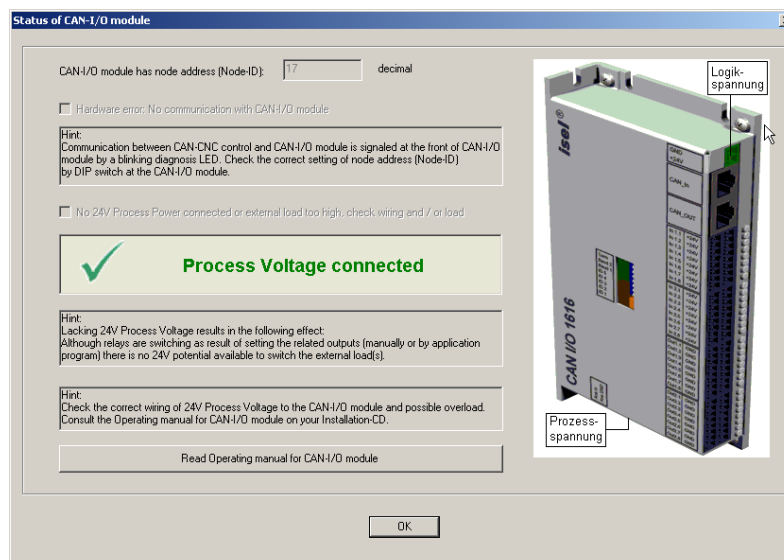
Inside the module management you can show version information of the used module DLL and the connected device type by pressing the button "Version".

4.4 Diagnosis function

This button allows you to access input/output functions of the connected CAN-I/O-module. In this dialog you can e.g. switch outputs separately or you can check the state of inputs.



4.5 Status information



Over the button “Status” you can check whether the process voltage is connected to the device.

! If there is no process voltage connected you can not measure 24V potential on the load connectors.